

REMARKS

This amendment responds to the Final Office Action dated December 31, 2002, in the above-identified patent application.

By this response, Applicants have amended claims 8, 14 and 21. Claims 8-10 and 12-25 are under consideration in the application, of which claims 8, 14 and 21 are in independent form. No claims are currently allowed. This Response is being filed within three months of the Final Office Action outstanding. No additional claim fees are required. This Response is being submitted via facsimile so that the Examiner may review the Response in a timely manner in order that Applicants may act within the three month Response deadline if the claims are not allowed as a result of this Response.

By this Response Applicants have amended independent claims 8, 14 and 21 to recite that the second nitride layer is positioned "directly on" the first nitride layer, wherein the second nitride is different from the second nitride. This amendment is a narrowing of the claims previously pending in the application which recited that the second nitride layer was positioned "on" the second nitride layer. Accordingly, the amendments submitted herein are not new matter and Applicants respectfully request such amendments to be entered.

In the Office Action dated December 31, 2002, the Examiner rejected claims 8-10, 12-14, 16-18 and 20-25 under 35 U.S.C. 102(e) as being allegedly anticipated by Lopatin et al. (U.S. Pat. No. 6,368,954). Lopatin et al. teach a single barrier layer, i.e., a layer comprised of a single barrier layer material: "a barrier layer" (col. 3, line 26); "a barrier layer 401" (col. 4, lines 30-31); "the barrier layer 401" (col. 4, lines 37, 46, 52, and 62; col. 5, lines 19, 20, and 29; and col. 7, line 28). Barrier layer 401 of Lopatin et al. may be formed "by a multiplicity of process cycles." (Col. 4, lines 46-47). However, each process cycle deposits the same nitride to build up the thickness of barrier layer 401 comprised of a single barrier layer material. Lopatin et al. do not teach or suggest different layers of a barrier metal thin film being comprised of different metal nitrides. Moreover, Lopatin et al. do not teach or suggest a device wherein a second, different metal nitride layer is positioned "directly" on a first nitride layer. Accordingly, Applicants believe that independent claims 8, 14 and 21, and corresponding dependent claims 9-10, 12-13, 16-18, 20 and 22-25 are in condition for allowance and Applicants respectfully request the Examiner to withdraw the rejection of these claims under 35 U.S.C. 102(e).

In the Final Office Action dated December 31, 2002, the Examiner rejected claims 8-10, 12-18 and 20-25 under 35 U.S.C. 102(e) as being allegedly anticipated by

Satta et al. (U.S. Pat. No. 6,391,785). Satta et al. teach only a single barrier material: "The barrier layer 26 consists of a material . . ." (col. 7, lines 50-51); "a metal nitride" is formed (col. 8, line 34); "a metal is thereby formed" (col. 9, line 61). Similar to Lopatin et al., Satta et al. teach that "layer 26 is built up in sequential steps wherein each step involves the formation of one atomic layer by a chemical reactor or adsorption. The barrier layer 26 consists of a material that prevents the diffusion of metal ions..." (col. 7, lines 48-51) (emphasis added). Satta et al. do not teach or suggest different layers of a barrier metal thin film being comprised of different metal nitrides, wherein the second metal nitride layer is positioned "directly" on the first nitride layer. Moreover, Satta et al. do not even address the benefits of such a multi-layered structure comprising alternating layers of different metal nitrides, wherein the nitrides are positioned directly on one another, as recited by Applicants in their claims as amended. Accordingly, for the reasons discussed above, Applicants believe that independent claims 8, 14 and 21, and corresponding dependent claims 9-10, 12-13, 15-18, 20 and 22-25 are in condition for allowance and Applicants respectfully request the Examiner to withdraw the rejection of these claims under 35 U.S.C. 102(e).

In the Office Action dated December 31, 2002, the Examiner rejected claims 21-25 under 35 U.S.C. 102(e) as being allegedly anticipated by Leem (U.S. Pat. No.

6,284,646). Leem et al. do not teach or suggest different layers of a barrier metal thin film being comprised of different metal nitrides, wherein the second metal nitride layer is positioned "directly" on the first nitride layer. Moreover, Leem et al. teach away from a second nitride layer positioned "directly on" a first nitride layer because Leem teaches a method wherein a conductive layer is positioned between each metal nitride layer. In particular, Figure 2C shows a barrier layer 22, conductive layers 24, 28, 32 and 36, and buffer layers 26, 30, and 34 positioned between each of the conductive layers. (col. 6, lines 10, 27, 45 and 66; col. 7, lines 8-9). None of Leem's buffer layers are positioned "directly" on a second buffer layer, as recited in Applicants' claim 21 as amended. Accordingly, for the reasons discussed above, Applicants believe that independent claim 21, and corresponding dependent claims 22-25 are in condition for allowance and Applicants respectfully request the Examiner to withdraw the rejection of these claims under 35 U.S.C. 102(e).

In the Office Action dated December 31, 2002, the Examiner rejected claims 15 and 19 under 35 U.S.C. 103(a) as being allegedly anticipated by Lopatin et al. Claims 15 and 19 are dependent on independent claim 14 as amended. Accordingly, for the reasons discussed above, Applicants believe that dependent claims 15 and 19 are in condition for allowance and Applicants respectfully request the Examiner

to withdraw the rejection of these claims under 35 U.S.C. 103(a).

In the Office Action dated December 31, 2002, the Examiner rejected claim 19 under 35 U.S.C. 103(a) as being allegedly anticipated by Satta et al. Claim 19 is dependent on independent claim 14 as amended. Accordingly, for the reasons discussed above, Applicants believe that dependent claim 19 is in condition for allowance and Applicants respectfully request the Examiner to withdraw the rejection of this claim under 35 U.S.C. 103(a).

Applicants respectfully request entry of this Amendment and consideration of the application as amended. The Examiner is encouraged to contact Applicants' counsel, Mr. David Ripma, at the number listed below if the Examiner has any questions regarding this application.

Respectfully submitted,

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